



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Problems Associated with Phosphate Slag in Pocatello
and Soda Springs, Idaho

FROM: Neal Nelson, Radiobiologist *NSN*
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TO: Robert Dyer, Acting Chief
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The use of phosphate slag containing about 28 pCi/g of most of the natural radioisotopes causes elevated radiation exposure in areas where it is used. The EG&G aerial radiological survey (EPA-8613, Feb. 1987) showed an extremely variable exposure rate across Pocatello and Soda Springs. From the report, a background rate of 11 to 14.5 $\mu\text{R/hr}$ will be used in exposure estimation.

Not unexpectedly the phosphorous and phosphate plants have exposure rates of 30 to 65 $\mu\text{R/hr}$ above a 12 $\mu\text{R/hr}$ background. In Pocatello, Soda Springs, and Fort Hall there are extensive residential areas where exposure rates are 8 to 15 $\mu\text{R/hr}$ above background and very large areas in Pocatello and Soda Springs where residential and business radiation exposure are about 30 $\mu\text{R/hr}$ above background.

The 30 $\mu\text{R/hr}$ exposure rate would yield 263 mrem/yr ($0.030 \text{ mrem/hr} \times 8766 \text{ hr/yr}$). Maximum risk would be for lifetime exposure at this rate, 0.263 rem/yr, for 74 years with a risk coefficient of 4×10^{-4} cancer deaths per rem ($0.263 \text{ rem/yr} \times 74 \text{ years} \times 4 \times 10^{-4} \text{ deaths/rem}$) or a life time risk of 7.8×10^{-3} , which may be 1.2×10^{-2} if BEIR V comes out.

There is a little data providing exposure rate measurements within residences. In 1978, the ORP/LVF reported some measurements of homes in Soda Springs (ORP/LV-78-2). Elevated exposure rates were reported in homes where slag had been used under and around the home. The highest indoor exposure rate

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reported was 53 $\mu\text{R/hr}$ above background. The risk associated with this gamma exposure rate for life time exposure with a 75% occupancy factor is about 1.0×10^{-2} ($465 \text{ mrem/yr} \times 74 \text{ yr} \times 4 \times 10^{-4} \text{ deaths/rem} \times 0.75$).

The same residences that had elevated gamma exposure rates also had slightly elevated indoor radon levels. Ambient radon progeny in these houses was about 0.01 WL greater than the background (ORP/LV-78-2). Life time risk associated with radon progeny exposure of 0.01 WL is 1.0×10^{-2} ($0.01 \text{ WL} \times 51.6 \mu\text{R/yr} \times 74 \text{ yr} \times 3.6 \times 10^{-4} \text{ deaths/WLM} \times .75$).

A person living in a high exposure rate home could then have a life time risk of 2×10^{-2} , perhaps going up to 2.5×10^{-2} when BEIR V comes out. In addition, there would be increased exposure to gamma from phosphate slag outside the home, e.g., under streets and sidewalks. This exposure outside the home could be a higher rate than that inside the home, there just is not enough detailed data to say.

It should also be noted that Pacific Northwest Laboratory (PNL-6358, 1987) and EG&G (EPA-8613, 1987) reports found highest exposure rates on streets and parking lots, playing outdoors may be as hazardous or more hazardous for children than staying at home. A similar potential is present for occupational exposure of bus drivers, street workers, delivery men, etc., during the time they are on the streets and even partially shielded by vehicles.

No data is available on exposure rates in businesses or schools, to assess nonresidential exposure.

Data available at present suggests in Pocatello, and Soda Springs, Idaho, the life time risk from phosphate slag used in construction and for fill purposes can be as high as 1×10^{-2} to 2×10^{-2} . It is not known if these are maximum risks, but it is probable that a number of persons have risks of this magnitude.

cc: Jerry Leitch, EPA/Region 10
Wayne Bliss, ORP/LVF
Raymond Brandwein (ANR-458)